

## Cell theory

It has taken several hundred years of research to formulate modern cell theory. Many scientists have contributed to developing the three main principles of this theory. These are:

- all organisms are composed of one or more cells;
- cells are the smallest units of life;
- all cells come from pre-existing cells.

This theory has amassed tremendous credibility, largely through use of the microscope – an important tool. Robert Hooke first described cells in 1665 while observing cork with a microscope he built himself. A few years later, Antonie van Leeuwenhoek observed the first living cells and referred to them as ‘animalcules’, meaning little animals. In 1838, botanist Mathias Schleiden stated that plants are made of ‘independent, separate beings’ called cells. One year later, the zoologist Theodor Schwann made a similar statement about animals.

The second principle continues to gain support today, as we have not been able to find any living entity that is not made of at least one cell.

Some very famous scientists, such as Louis Pasteur in the 1860s, have performed experiments to support the last principle. After sterilizing chicken broth by boiling, Pasteur showed that living organisms would not ‘spontaneously’ reappear. Only after exposure to pre-existing cells was life able to re-establish itself in the sterilized chicken broth.

## Functions of life

All organisms exist in either a unicellular or a multicellular form. And all organisms carry out all the functions of life. These functions include:

- metabolism;
- growth;
- reproduction;
- response;
- homeostasis;
- nutrition.

All these functions are tied together to produce a functioning living unit.

- Metabolism includes all the chemical reactions that occur within an organism.
- Growth may be limited but is always evident in one way or another.
- Reproduction involves hereditary molecules that can be passed to offspring.
- Response to the environment is imperative to the survival of the organism.
- Homeostasis refers to maintaining a constant internal environment. Examples of constant internal environments may involve temperature and acid–base levels.
- Nutrition is all about providing a source of compounds with many chemical bonds which can be broken to provide the organism with the energy and the nutrients necessary to maintain life.

## Cells and sizes

Cells are made up of a number of different subunits. These subunits are often of a particular size, but all are microscopically small. In most cases, microscopes with high magnification and resolution are needed to observe cells and especially their subunits. Resolution refers to the clarity of a viewed object.



Theories are developed after the accumulation of much data. Sometimes, theories are completely abandoned because of conflicting evidence.



Viruses are not considered to be living. They can not carry out the functions of life on their own. However, they do utilize cells to perpetuate themselves.



The functions of life are manifested in different ways in the various types of organism, but all life forms maintain the same general functions.

You may see different terms for these functions in other sources.